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<input type="checkbox"/>	L8	I3 and L7	56
<input type="checkbox"/>	L7	cheese.clm.	1750
<input type="checkbox"/>	L6	I3 and L5	482
<input type="checkbox"/>	L5	cheese	12468
<input type="checkbox"/>	L4	I2 and L3	4
<input type="checkbox"/>	L3	(co adj extruded) or coextruded	10111
<input type="checkbox"/>	L2	cheese adj snack	51
<input type="checkbox"/>	L1	cheese adj nack	0

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on November 14, 2001 (Attorney Docket No. 67345). These solid milk products are high solids, low moisture, high-protein, shelf-stable milk products which are solid at ambient temperatures and, therefore, can be conveniently transported and consumed by hand.

- 5       U.S. Patent 4,299,855 (November 10, 1981) described a method of producing a snack-sized cheese product comprising the steps of cooling a molten cheese to a temperature of about 35°C, heating a surface area extending in the radial direction from the surface of the cheese to a thickness of 1/8 to 1/6 of the cheese diameter of the cooled cheese to a temperature of
- 10      about 52 to 39°C, cutting the heated cheese into snack sized pieces by rolling within a mold die for rounding the pieces of cheese, and forming each of the snack sized pieces into a rounded shape without corners, thereby providing a snack sized cheese product formed into a desirable rounded shape such as spherical, ellipsoidal, and barrel shape and having good
- 15      appearance without creases and cracks on the surface thereof as well as a homogeneous texture.

- U.S. Patent 6,235,321 (May 22, 2001) provided a snack food product in the form of resilient, molded, self-sustaining bodies preferably made from a heated mixture comprising a dairy product (cheese, yogurt, or pudding),
- 20      gelatin, fat, and water. The product bodies are small and bite sized, having a mass to surface area ratio of from about 0.05-5 g/cm<sup>2</sup>, which facilitates molding thereof. Preferred food products are prepared by first creating a heated flowable mixture of including cheese, gelatin, fat, and water, and depositing small quantities of the mixture into molding depressions formed in
- 25      powdered starch; after hardening, the resultant products are separated from the starch and packaged.

- It would be desirable to provide cheese-containing products which are more convenient to consume and which have increased nutritional benefits. It would also be desirable to provide cheese-containing products in attractive
- 30      and/or convenient shapes, sizes, and/or forms, which encourage

like. Especially preferred vegetables for use in the present invention include premium quality intermediate moisture vegetables as described in U.S. Patent Application Serial Number 09/638,335, filed on August 14, 2000, now U.S. Patent No. 6,403,134 (Attorney Docket No. 68732) which is hereby incorporated by reference.

- 5    Suitable meats include, for example, beef, poultry, pork, and seafood. Such meats should be ready-to-eat (i.e., precooked) and may be in the form of chunks/pieces or a paste. Suitable fruits include, for example, blueberries, strawberries, figs, and the like. If desired, either of the phases may contain colorants, flavorants (e.g., spices, herbs, salt), preservatives, antimicrobial agents, functional components (e.g., thickening agents, water activity depressants), and the like.
- 10    10    agents, functional components (e.g., thickening agents, water activity depressants), and the like.

Generally, the nutritionally superior cheese products of this invention contain about 30 to about 70 percent of the first cheese phase and about 30 to about 70 percent of the second edible phase. More preferably, the 15 nutritionally superior cheese products of this invention contain about 40 to about 60 percent of the first cheese phase and about 40 to about 60 percent of the second edible phase.

The nutritionally superior cheese products of this invention do not require the use of adhesives or heat to bind the at least two phases. 20 Moreover, the nutritionally superior cheese products of the present invention do not require moisture barriers separating the cheese phase and the second edible phase. The discrete phases of the nutritionally superior cheese products of the present invention remain separate and distinct throughout their shelf life without the use of such adhesive, heat, and/or moisture 25 barriers. Although not wishing to be limited by theory, it is though that the discrete phases remain separate and distinct throughout their shelf life because the water activity and pH of the second edible phase are closely matched to the water activity and pH of the cheese phase, the viscosities of the two phases are adjusted to optimal levels for co-extrusion, and the co- 30 extrusion is carried out under low to moderate shear conditions. These

sorbate, sodium benzoate, sorbic acid, propionic acid, cultured skim milk, cultured dextrose, and the like. Natamycin, if used, is normally less than about 50 ppm and preferably in the range of about 5 to about 45 ppm. The use of natamycin is described in, for example, U.S. Patent 6,156,362

- 11/22/04 5 (6,156,362), U.S. Patent 6,156,362 (April 20, 1999), U.S. Patent Application Serial Number 09/275,471, filed March 24, 1999 (Attorney Docket No. <sup>now U.S. Patent No. 6,090,417</sup> 64893), and U.S. Patent Application Serial Number 09/618,514, filed July 18, 2000 (<sup>now U.S. Patent No. 6,426,152</sup> Attorney Docket No. 68155), all of which are hereby incorporated by reference.
- 10 Nisin, if used, is normally less than about 2000 IU and preferably in the range of about 50 to about 1500 IU. An especially preferred form of nisin for use in the present invention is nisin-containing whey derived from a nisin-producing culture or the curds obtained from such a culture as described in U.S. Patent Application Serial Number 09/386,795, filed August 31, 1999 (<sup>now U.S. Patent No. 6,110,509</sup> Attorney Docket No. 66365), U.S. Patent Application Serial Number 09/638,335, filed August 14, 2000 (<sup>now U.S. Patent No. 6,403,131</sup> Attorney Docket No. 68732), and U.S. Patent Application Serial Number 09/386,609, filed August 31, 1999 (<sup>now U.S. Patent No. 6,136,351</sup> Attorney Docket No. 66367), all of which are hereby incorporated by reference.

- 11/22/04 15 Other antimicrobics such as potassium sorbate, sodium benzoate, sorbic acid, propionic acid, cultured skim milk, and cultured dextrose, if used, are generally at levels less than about 2000 ppm. Potassium sorbate and sodium benzoate, if used, are preferably present in a ratio of about 0.5 to about 1.5 and more preferably a ratio of about 1:1. Cultured skim milk and cultured dextrose are natural antimicrobials which are available from Rhodia Food Inc. (Cranbury N.J.) under the tradename MicroGARD®.

The following examples are provided to illustrate the invention and not to limit it. Unless otherwise indicated, all percentages and ratios are by weight.

- EXAMPLE 1. This example illustrates the preparation of a nutritionally superior cheese extruded product having a first cheese phase and a second
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The resulting tomato-based mixture was cooked at about 180°F for about 2 to about 3 minutes, cooled immediately to room temperature, and then stored under refrigeration conditions until used. The mixture had a water activity of about 0.928 and a pH of about 5.7. The cheese phase consisted of

5 mozzarella cheese having a water activity of about 0.93 and a pH of about 5.2.

The nutritionally superior cheese extruded product was prepared using a Cornucopia™ KN400 extruder (Rheon U.S.A., Huntersville, N.C.) operating at a speed of about 700 to about 720 pounds/hr (about 90 percent of

10 maximum speed). The cheese phase in the feeder hopper was held at a temperature of about 55°F. The tomato-based mixture in the feeder hopper was held at a temperature of about 45°F. A die was used to produce a nutritionally superior cheese extruded product having essentially the shape as illustrated in Figure 2, panel C. The extruder feed rates were selected to

15 provide a product containing about 60 percent cheese phase and about 40 percent tomato-based phase. The resulting product had a shelf life of about 3 months at refrigerated temperatures. The resulting product could be hand held and consumed.

**EXAMPLE 3.** This example illustrates the preparation of a nutritionally superior cheese extruded product having a first cheese phase and a second cheddar-broccoli phase. A cheddar-broccoli mixture was prepared by blending about 33 percent broccoli bits and about 67 percent pasteurized processed cheese spread. The broccoli bits were prepared as described in

20 U.S. Patent Application Serial Number 09/638,335, filed on August 14, 2000, <sup>now U.S. Patent No.</sup> *6,403,134*

25 ~~(Attorney-Docket No. 68732)~~ The resulting cheddar-broccoli mixture was cooked at about 180°F for about 2 to about 3 minutes, cooled immediately to room temperature, and then stored under refrigeration conditions until used. The mixture had a water activity of about 0.908 and a pH of about 5.7. The cheese phase consisted of a mild cheddar cheese having a water activity of

30 about 0.921 and a pH of about 5.